



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C07K 14/435, A61K 38/17	A3	(11) International Publication Number: WO 98/23639
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(21) International Application Number: PCT/US97/22096		(74) Agent: KITCHELL, Barbara, S.; Arnold, White & Durkee, P.O. Box 4433, Houston, TX 77210 (US).
(22) International Filing Date: 26 November 1997 (26.11.97)		
(30) Priority Data: 60/031,860 27 November 1996 (27.11.96) US 60/059,126 17 September 1997 (17.09.97) US		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(71) Applicants: UNIVERSITY OF FLORIDA [US/US]; 223 Grin- ter Hall, Gainesville, FL 32611 (US). THE REGENTS OF THE UNIVERSITY OF CALIFORNIA [US/US]; 300 Lake- side Drive, Oakland, CA 94612-3550 (US). BACHEM BIO- SCIENCE, INC. [US/US]; 3700 Horizon Drive, King of Prussia, PA 19406 (US). BIOMOLECULAR RESEARCH INSTITUTE [AU/AU]; 343 Royal Parade, Parkville, VIC 3052 (AU).		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
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(54) Title: ShK TOXIN COMPOSITIONS AND METHODS OF USE		
(57) Abstract		
<p>Disclosed are methods and compositions comprising DNA segments, and proteins derived from sea anemone species. More particularly, it concerns the novel ShK toxin, ShK toxin analogs, chemically-modified toxin analogs, and nucleic acid segments encoding the ShK toxin from <i>Stichodactyla helianthus</i>. Various methods for making and using these DNA segments, DNA segments encoding synthetically-modified ShK toxins, and native and synthetic ShK peptides are disclosed, such as, for example, the use of DNA segments as diagnostic probes and templates for protein production, and the use of proteins, fusion protein carriers and peptides in various immunological and diagnostic applications.</p>		

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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US 97/22096

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C07K14/435 A61K38/17

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C07K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	M.W. PENNINGTON: "Identification of three separate binding sites on SHK toxin, a potent inhibitor of voltage-dependent potassium channels in human T-lymphocytes and rat brain" BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS., vol. 219, February 1996, ORLANDO, FL US, pages 696-701, XP002061813 cited in the application	1,2,4-9, 15-19, 22,23, 26-36, 39,41-46
Y	see the whole document see page 699, paragraph 2 - paragraph 3; table 1 --- -/--	3,10-14, 20,21, 24,25, 37,38,40

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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- "E" earlier document but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "A" document member of the same patent family

Date of the actual completion of the international search

9 April 1998

Date of mailing of the international search report

20. 05 1998

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US 97/22096

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,0	M.W. PENNINGTON ET AL.: "Identification of essential residues in the potassium channel inhibitor ShK toxin: analysis of monosubstituted analogs" PEPTIDES: CHEMISTRY, STRUCTURE AND BIOLOGY - PROCEEDINGS OF THE 14TH AMERICAN PEPTIDE SYMPOSIUM, June 1995, ESCOM - LEIDEN, NL, pages 192-194, XP002061814	1,2,4-9, 15-19, 22,23, 26-36, 39,41-46
Y	see the whole document	3,10-14, 20,21, 24,25, 37,38,40
	see page 194, last paragraph; table 1 ---	
X	J.E. TUDOR ET AL.: "Solution structure of ShK toxin, a novel potassium channel inhibitor from a sea anemone" NATURE STRUCTURAL BIOLOGY, vol. 3, no. 4, April 1996, pages 317-320, XP002061901	1-4,7,8, 15-19, 22,23, 26-30, 32, 34-40, 45,46
Y	see the whole document	3,10-14, 20,21, 24,25, 37,38,40
	see page 317, column 2, line 4 - line 9 ---	
X	M.W. PENNINGTON ET AL.: "Chemical synthesis and characterisation of ShK toxin" INTERNATIONAL JOURNAL OF PEPTIDE AND PROTEIN RESEARCH, vol. 46, 1995, COPENHAGEN DK, pages 354-358, XP002061815 cited in the application	1,2,4,7, 8,15-19, 22,23, 26-30, 32, 34-36, 39,45,46
Y	see the whole document	3,10-14, 20,21, 24,25, 37,38,40

Y	WO 88 06451 A (XOMA CORP) 7 September 1988	3,10-14, 20,21, 24,25, 37,38,40
	see the whole document ---	
Y	EP 0 219 716 A (TOA NENRYO KOGYO KK ;TSURU SUMIAKI (JP)) 29 April 1987	3,10-14, 20,21, 24,25, 37,38,40
	see the whole document -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 97/22096

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(e) for the following reasons:

1. ☒ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 97/22096

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Remark : Although claims 1-11, 22-25, 29-40 and at least in part 45-46 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter: nal Application No
PCT/US 97/22096

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 8806451 A	07-09-88	AU 619740 B	06-02-92
		AU 1421488 A	26-09-88
		DE 3875306 A	19-11-92
		EP 0303681 A	22-02-89
		JP 1502909 T	05-10-89

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		JP 6069959 B	07-09-94
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		AU 6315986 A	02-04-87
